

Chapter 3. Cancer Prevention

*Daniel Nixon, MD, Associate Director, Cancer Prevention and Control,
Hollings Cancer Center, Medical University of South Carolina*

In 1996, 555,000 Americans lost their lives to cancer. More than half of those deaths could have been prevented with existing scientific knowledge on cancer prevention. Yet only a fraction of the nation's total health care dollars, less than one percent, goes toward prevention.

There are urgent reasons to increase the emphasis on and funding for cancer prevention. These include an upward trend in cancer incidence, the increasing cost of cancer and the unfortunate lagtime between scientific progress and medical and public health applications.

Cancer Incidence

Cancer rates are increasing. The total number of new cases in the United States grew to about 1.2 million in 1997. Ten years ago, one in four Americans would experience cancer during his or her lifetime; now the rate is one in three.

Health Care Costs

Health care costs are increasing enormously because of expensive technology being applied to the management of chronic disease in an increasingly older society. More than a third of Medicare dollars are spent in the last months of life.

Lagtime

It generally takes years, even decades, for cancer prevention knowledge and technology to reach average people. The Pap smear, for example, was developed in the early 1940's but was not widely used until the 1970's. Mammography became available in the 1950's but was not

widely promoted until the early 1980's. This same pattern is mirrored today in tobacco control efforts and in dietary recommendations (diet and cancer relationships have been suspected for nearly 100 years). These delays cost people their lives - and the delays are even more significant among working class, poor, and rural populations.

Behavioral Risk Factors

A large percentage of cancers are associated with lifestyle: what we eat, drink and smoke and how much exposure to the sun we get. Of the annual cancer deaths in the US, about one third are related to tobacco use (especially lung cancer and probably bladder and pancreatic cancers). Another third may be related to unhealthy diets; these include breast, colon and prostate cancers. Excess alcohol consumption also contributes to cancer, and has been implicated in cancer of the head and neck and esophagus. External factors such as environmental pollution contribute to a very small percentage of cancers.

Tobacco Use

Using tobacco causes about one-third of the annual cancer deaths in the US, especially lung cancer and oral cancers. The evidence for this

goes back almost 50 years. Chronic exposure to passive or secondhand smoke also contributes to cancer mortality. Smoking is also implicated in bladder, kidney, esophageal and pancreatic cancers.

An estimated 23.9% of South Carolinians smoke, according to the state's most recent Behavioral Risk Factor Surveillance Survey (BRFSS Data, 1995). This includes 28.0% of the male population and 20.1% of the female population. Whites are more likely to smoke than blacks (26% to 18.3%) and men are more likely to smoke than women (28 % to 20.1%). Trend data indicate that the percentage of South Carolinians who smoke is decreasing: from 30.2% in 1985 to 23.9 percent in 1994.

The trend data for adolescents, however, is alarming. In South Carolina, the percentage of youths who use tobacco increased roughly 60% from 1991 to 1995 and is still on the rise. More than 40% of both white males and white females smoke (MRS, 1995). According to the Campaign for Tobacco-Free Kids, one-third of these kids will eventually die of tobacco-related

Diet and Cancer

Unhealthy diets are related to another one-third of cancer deaths in the US. The cancers related to diet are those of the gastrointestinal tract (colon, rectum, esophagus, stomach, pancreas and liver) and those of hormone-related origin (breast, ovary, endometrium and prostate).

The diet and cancer link was originally recognized from epidemiologic studies, because cancer rates vary widely around the world. People in industrialized countries who consume high-fat, low-fiber diets have much higher rates of breast, colon, and prostate cancer than people in non-industrialized nations.

A second link between cancer and diet came from migration studies. When people move to a new country, they tend over time to acquire the cancer risk of their new location. Japanese immigrants to the United States, for example, have a much higher risk of breast and colon cancer than native Japanese. Control studies have also demonstrated that diets low in fat are associated with lower cancer risks.

More recent studies indicate that what we eat may be as important as what we avoid. Dietary fiber, micronutrients and vitamins, along with phytochemicals, a host of non-nutrient components in vegetables and fruits, can lower cancer risk and protect people from cancer. An example of a phytochemical is ellagic acid, which is found in raspberries, strawberries, walnuts, and many other plants. Approximately 1000 potential chemopreventive compounds are now recognized and more are being tested in clinical trials.

In 1997, the American Cancer Society updated their guidelines for nutrition/ diet and cancer prevention. These guidelines encourage people to 1) Choose most food from plant sources; 2) Limit intake of high-fat foods, particularly those from animal sources; 3) Be physically active: achieve and maintain a healthy weight; and 4) Limit consumption of alcoholic beverages. BRFSS data indicate that 68.6% of South Carolinians eat fewer than five fruits or vegetables daily (BRFSS, 1995).

Alcohol and Cancer

Excess alcohol consumption is implicated cancer of the mouth, pharynx, larynx, esophagus and liver. Alcohol is particularly deadly when it is used in conjunction with tobacco. Chronic abuse of both tobacco and alcohol increases the risk of oral and respiratory tract cancer significantly. Poor nutrition, often combined with alcohol abuse, also increases the risk of head, neck, and esophageal cancers.

Physical Activity

Physical inactivity is increasingly recognized as a cancer risk factor. Colon cancer risk is greater in sedentary people, and evidence is accumulating that low levels of physical activity increase the risk of breast and prostate cancer as well. The US Surgeon General recommends 30 minutes of moderate physical activity a day. This could be met by walking briskly for about two miles, activities such as swimming, calisthenics or jogging, or everyday activities such as gardening, housework, or yardwork. BRFSS data indicate that more than half of all South Carolinians, 63.4% of the population, lead a sedentary lifestyle.

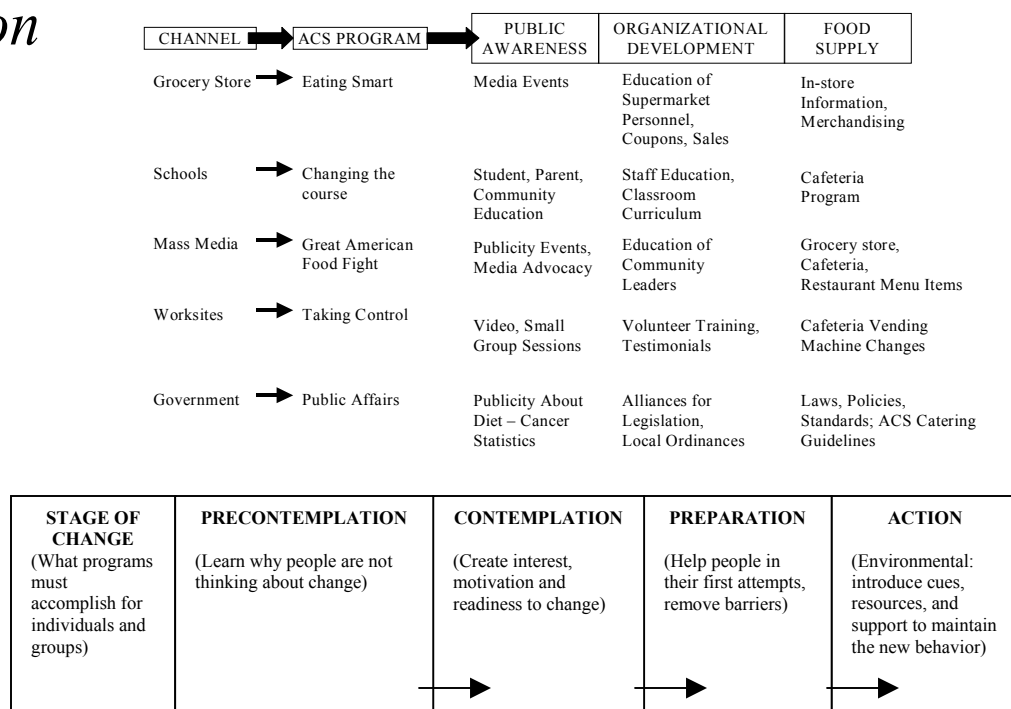
Occupational Exposures

Pollution and work-place exposures account for only about 7% of cancers (Doll and Peto, 1981), although most people believe that the figure is much higher. Some common agents in the environment can trigger the develop of cancer, like asbestos (lung cancer), benzene in gasoline fumes (leukemia), radium (bone cancer), coal tar (skin cancer) and radon (lung cancer). If people are exposed to these agents, at work or at home, their risk of getting cancer depends on how much of the cancer-causing agent the person came in contact with and the length of exposure.

Strategies for Public Health Intervention

Enormous efforts by national public and private health organizations have fallen short in their attempt to make real, sustained changes in our behavioral habits. Many authorities believe that further cancer control lifestyle changes will require significant changes in social norms and values promoted by individual, community and environmental strategies along with targeted mass media campaigns and national policy decisions. Figure 3.1 (after Bal, 1995), depicts how this process can work using dietary change as an example.

Cancer Prevention Through Diet Existing ACS Programs as Examples



Adapted from Bal & Foerster

Figure 3.1

Community Level Change

Kathleen Whitten, University of Virginia

The choices people make about healthy lifestyles and the communities they live in have a major impact on their health. Most health conditions are not caused by a lack of medical technology or lack of access to medical professionals (Healthcare Forum, 1994). The solutions to many of the leading causes of illness and premature death do not rest with hospitals; instead, they lie in socioeconomic factors, behavioral choices and the practices we encourage or condone as family members, neighbors and fellow citizens in communities (Healthcare Forum, 1994).

Community organization is based on two principles: community participation and local leadership or ownership. The principle of participation means that large-scale behavioral change requires the people affected by a problem to be involved in defining it, creating ways to solve it, and establishing structures to make sure that the change endures. Local ownership means that local people must have a sense of responsibility for and control over programs promoting change in their communities, so that change continues after the initial organizing efforts end. Both principles are based on the premise that change is more likely to be successful and permanent when the people it affects are involved in as many phases of that change as possible.

Skin Cancer Prevention

*Edward McClay and Mary-Eileen McClay
Melanoma Research Clinic, Hollings Cancer
Center, Medical University of South Carolina*

The most efficient way to reduce mortality from skin cancer is to prevent the development of the disease. There are several epidemiological facts that support the theory that UV radiation from the sun is responsible for the majority of malignant melanomas. The incidence of melanoma is highest in the Caucasian population, especially in those who cannot tan effectively; the incidence of melanoma generally increases closer to the equator; melanoma is most common in Caucasian patients who have had blistering sunburns; and UV radiation has been shown to be a complete carcinogen and to induce melanoma in animal models (Ley et al., 1989; Setlow, et al., 1989; Romerdhal, et al., 1989). As the sun is the primary source for UV radiation exposure for the majority of people, then avoidance of the sun should ultimately reduce the risk of developing melanoma. There are a variety of strategies suggested to accomplish this: avoid sun exposure between the hours of 10am to 3pm when UV rays are strongest, cover up as much as possible, wear wide-brimmed hats and apply sunscreen, using an SPF of at least 15.

Sunscreens

Recent studies on the use of sunscreen in Australia have demonstrated that the regular use of sunscreens with an SPF of 17 decreased the incidence of new solar keratoses and also enhanced healing of already established lesions (Thomson, et al., 1993). Similar data is not available to support a relationship between the use of sunscreens and melanoma. Two population-based studies conducted in Europe have suggested that the use of sunscreens is associated with an increased risk of developing melanoma (Autier, et al.; Westerdhal, et al.,

1995). In contrast, a similar study conducted in the US, which evaluated melanoma in women, showed that a failure to use sunscreen was an important risk factor in the development of melanoma (Holly et al., 1995). These studies must be interpreted with caution, as they were conducted using retrospective data. Controls such as the type of sunscreen, the amount used and a previous history of sunburn were not always employed. Additionally, the amount of sun exposure, protected or unprotected was not quantified.

At the present time, there is good data to support the fact that sunscreens can prevent the development of solar keratoses and allow healing of solar elastoses. On this basis, it is justifiable to recommend the use of sunscreens routinely before sun exposure. However, while it is reasonable to conclude that a similar protection for melanoma exists, we should caution our patients that this area is more controversial and that the best advice is still to avoid sun exposure whenever possible.

Prevention Strategies

The most obvious target to begin with is the parents of young children. As 80% of our lifetime sun exposure generally occurs before the age of 18, parents can have a tremendous impact on the lifetime sun exposure of the upcoming generations. The education of parents can take many forms. Public service ads should be developed and run on a year-round basis. The Australian program of "Slip, Slop 'and Slap" (Slip on a tee shirt, Slop on the sunscreen and Slap on a hat) was a tremendous success and became the model for future programs. Deliverers of health care, physicians, nurses, physician assistants, and nurse practitioners need to be educated about prevention of skin cancer. Many patients are far more likely to visit a primary care physician than a dermatologist. Pediatricians can also play a role in educating children and monitoring their sun exposure.